Claims

[1]

A light control film having a rough surface, wherein, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, an average of slopes of the curved surface (θ_{nv} (degree)) of the rough surface with respect to a base plane of the film is not less than 27 degrees and not more than 70 degrees at substantially any position on the light control film.

[2]

A light control film having a rough surface formed by a patterned layer comprising a material having a refractive index n, wherein, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, an average of slopes of the curved surface (θ_{nv} (degree)) of the rough surface with respect to a base plane of the film is not less than (59 − 20n) degrees and not more than 70 degrees at any position on the light control film.

[3]

A light control film having a rough surface, wherein, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or

larger defined at an arbitrary position on the rough
surface by using height data of the rough surface measured
with predetermined intervals for the longitudinal and
transverse directions in the approximately square region,
an average of slopes of the curved surface (θ_{nv} (degree))
of the rough surface with respect to a base plane of the
film and a ratio of an area of the approximately square
region (A1) and a surface area of the approximated curved
surface of the rough surface (A2) ($A_r = A2/A1$) satisfy the
following equation (1) or (2) at substantially any position
on the light control film.

$\theta_{nv} \div A_r \geqq 22$ (1)

$30 \leqq \theta_{nv} \times A_r \leqq 140$ (2)

[4]

A light control film having a rough surface formed by
a patterned layer comprising a material having a refractive
index n, wherein, for a curved surface of the rough surface
approximated in an approximately square region having an
area of 1 mm^2 or larger defined at an arbitrary position on
the rough surface by using height data of the rough surface
measured with predetermined intervals for the longitudinal
and transverse directions in the approximately square
region, an average of slopes of the curved surface (θ_{nv}
(degree)) of the rough surface with respect to a base plane
of the film and a ratio of an area of the approximately
square region (A1) and a surface area of the approximated
curved surface of the rough surface (A2) ($A_r = A2/A1$)
satisfy the following equation (3) or (4) at substantially
any position on the light control film.

$\theta_{nv} \div A_r \times n^2 \geqq 35$ (3)

$60 \leqq \theta_{nv} \times A_r \times n^2 \leqq 350$ (4)

[5]

A light control film having a rough surface, wherein

a condition that, for a curved surface of the rough surface
approximated in an approximately square region having an
area of 1 mm^2 or larger defined at an arbitrary position on
the rough surface by using height data of the rough surface
measured with predetermined intervals for the longitudinal
and transverse directions in the approximately square
region, an average of slopes of the curved surface (θ_{nv}
(degree)) of the rough surface with respect to a base plane
of the film is not less than 27 degrees and not more than
70 degrees, and an absolute value of a numerical value
(A_{sk}) calculated in accordance with the equation (5) by
using all the height data of the rough surface is not more
than 1.2 is satisfied at substantially any position on the
light control film.

[# 1]

$$A_{sk} = \left.\frac{\sum_{i=1}^{m} z_i^{\,3}}{m} \middle/ \sqrt{\frac{\sum_{i=1}^{m} z_i^{\,2}}{m}}^{\,3}\right. \qquad \cdots (5)$$

[In the equation (5), z_i represents a value obtained by
subtracting a height of average plane of the rough surface
from a measured surface height, and m represents a number
of measurement points.]

[6]

A light control film having a rough surface formed by
a patterned layer comprising a material having a refractive
index n, wherein a condition that, for a curved surface of
the rough surface approximated in an approximately square
region having an area of 1 mm^2 or larger defined at an
arbitrary position on the rough surface by using height
data of the rough surface measured with predetermined
intervals for the longitudinal and transverse directions in
the approximately square region, an average of slopes of

the curved surface (θ_{nv} (degree)) of the rough surface with respect to a base plane of the film is not less than (59 - .20n) degrees and not more than 70 degrees, and an absolute value of a numerical value (A_{sk}) calculated in accordance with the equation (5) by using all the height data of the rough surface is not more than 1.2 is satisfied at substantially any position on the light control film.

[# 2]

$$A_{sk} = \frac{\sum_{i=1}^{m} z_i^{3}}{m} \left/ \sqrt{\frac{\sum_{i=1}^{m} z_i^{2}}{m}}^{3} \right. \quad \cdots (5)$$

[In the equation (5), z_i represents a value obtained by subtracting a height of average plane of the rough surface from a measured surface height, and m represents a number of measurement points.]

[7]

A light control film having a rough surface, wherein a condition that, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, an average of slopes of the curved surface (θ_{nv} (degree)) of the rough surface with respect to a base plane of the film is not less than 27 degrees and not more than 70 degrees, and a numerical value (A_{ku}) calculated in accordance with the equation (6) by using all the height data of the rough surface is not less than 1.5 and not more than 5.0 is satisfied at substantially any position on the light control film.

[# 3]

$$A_{ku} = \left. \frac{\sum_{i=1}^{m} z_i^4}{m} \middle/ \sqrt{\frac{\sum_{i=1}^{m} z_i^2}{m}}^{\,4} \right. \quad \cdot \cdot \cdot (6)$$

[In the equation (6), z_i represents a value obtained by subtracting a height of average plane of the rough surface from a measured surface height, and m represents a number of measurement points.]

[8]

A light control film having a rough surface formed by a patterned layer comprising a material having a refractive index n, wherein a condition that, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, an average of slopes of the curved surface (θ_{nv} (degree)) of the rough surface with respect to a base plane of the film is not less than (59 – 20n) degrees and not more than 70 degrees, and a numerical value (A_{ku}) calculated in accordance with the equation (6) by using all the height data of the rough surface is not less than 1.5 and not more than 5.0 is satisfied at substantially any position on the light control film.

[# 4]

$$A_{ku} = \left. \frac{\sum_{i=1}^{m} z_i^4}{m} \middle/ \sqrt{\frac{\sum_{i=1}^{m} z_i^2}{m}}^{\,4} \right. \quad \cdot \cdot \cdot (6)$$

[In the equation (6), z_i represents a value obtained by

subtracting a height of average plane of the rough surface from a measured surface height, and m represents a number of measurement points.]

[9]

A light control film having a rough surface, wherein a condition that, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, a ratio of an area of the approximately square region (A1) and a surface area of the approximated curved surface of the rough surface (A2) (A_r = A2/A1) is not less than 1.2 and not more than 2.5, and absolute value of a numerical value (A_{sk}) calculated in accordance with the equation (5) by using all the height data of the rough surface is not more than 1.2 is satisfied at substantially any position on the light control film.

[# 5]

$$A_{sk} = \frac{\sum_{i=1}^{m} z_i^3}{m} \left/ \sqrt{\frac{\sum_{i=1}^{m} z_i^2}{m}}^{\,3} \right. \quad \cdots (5)$$

[In the equation (5), z_i represents a value obtained by subtracting a height of average plane of the rough surface from a measured surface height, and m represents a number of measurement points.]

[10]

A light control film having a rough surface formed by a patterned layer comprising a material having a refractive index n, wherein a condition that, for a curved surface of the rough surface approximated in an approximately square

region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, a ratio of an area of the approximately square region (A1) and a surface area of the approximated curved surface of the rough surface (A2) (A$_r$ = A2/A1) is not less than (2 - 0.5n) and not more than 2.5, and absolute value of a numerical value (A$_{sk}$) calculated in accordance with the equation (5) by using all the height data of the rough surface is not more than 1.2 is satisfied at substantially any position on the light control film.

[# 6]

$$A_{sk} = \frac{\sum_{i=1}^{m} z_i^3}{m} \bigg/ \sqrt{\frac{\sum_{i=1}^{m} z_i^2}{m}}^{\,3} \qquad \cdots (5)$$

[In the equation (5), z$_i$ represents a value obtained by subtracting a height of average plane of the rough surface from a measured surface height, and m represents a number of measurement points.]

[11]

A light control film having a rough surface, wherein a condition that, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, a ratio of an area of the approximately square region (A1) and a surface area of the approximated curved surface of the rough surface (A2) (A$_r$ = A2/A1) is not less than 1.2 and not more than 2.5, and a numerical value A$_{ku}$

calculated in accordance with the equation (6) by using all the surface height data is not less than 1.5 and not more than 5.0 is satisfied at substantially any position on the light control film.

[# 7]

$$A_{ku} = \frac{\sum\limits_{i=1}^{m} z_i^4}{m} \Bigg/ \sqrt{\frac{\sum\limits_{i=1}^{m} z_i^2}{m}}^{\,4} \quad \cdot \cdot \cdot (6)$$

[In the equation (6), z_i represents a value obtained by subtracting a height of average plane of the rough surface from a measured surface height, and m represents a number of measurement points.]

[12]

A light control film having a rough surface formed by a patterned layer comprising a material having a refractive index n, wherein, for a curved surface of the rough surface approximated in an approximately square region having an area of 1 mm^2 or larger defined at an arbitrary position on the rough surface by using height data of the rough surface measured with predetermined intervals for the longitudinal and transverse directions in the approximately square region, a ratio of an area of the approximately square region (A1) and a surface area of the approximated curved surface of the rough surface (A2) (A_r = A2/A1) is not less than (2 - 0.5n) and not more than 2.5, and a numerical value A_{ku} calculated in accordance with the equation (6) by using all the surface height data is not less than 1.5 and not more than 5.0 at substantially any position on the light control film.

[# 8]

$$A_{ku} = \frac{\displaystyle\sum_{i=1}^{m} z_i^4}{m} \Bigg/ \sqrt{\frac{\displaystyle\sum_{i=1}^{m} z_i^2}{m}}^{\,4} \qquad \cdots (6)$$

[In the equation (6), z_i represents a value obtained by subtracting a height of average plane of the rough surface from a measured surface height, and m represents a number of measurement points.]

[13]

The light control film according to any one of claims 1 to 12, wherein absolute value of average (φ_{ave}) of angles (φ, -180 degrees < φ ≦ 180 degrees) between orthogonal projections of normals of the curved surface of the rough surface projected on the base plane and one side of the approximately square region is not more than 5 degrees irrespective of the direction along which the approximately square region is defined in the rough surface.

[14]

A backlight unit comprising a light guide plate equipped with a light source on at least one end portion thereof and having a light emergent surface approximately perpendicular to the end portion and a light control film provided on the light emergent surface of the light guide plate, wherein the light control film according to any one of claims 1 to 13 is used as the light control film.

[15]

The backlight unit according to claim 14, wherein a prism sheet is used between the light control film and the light guide plate.

[16]

A backlight unit comprising a light source, a light diffusive plate provided on one side of the light source

and a light control film provided on the side of the light diffusive plate opposite to the light source side, wherein the light control film according to any one of claims 1 to 13 is used as the light control film.